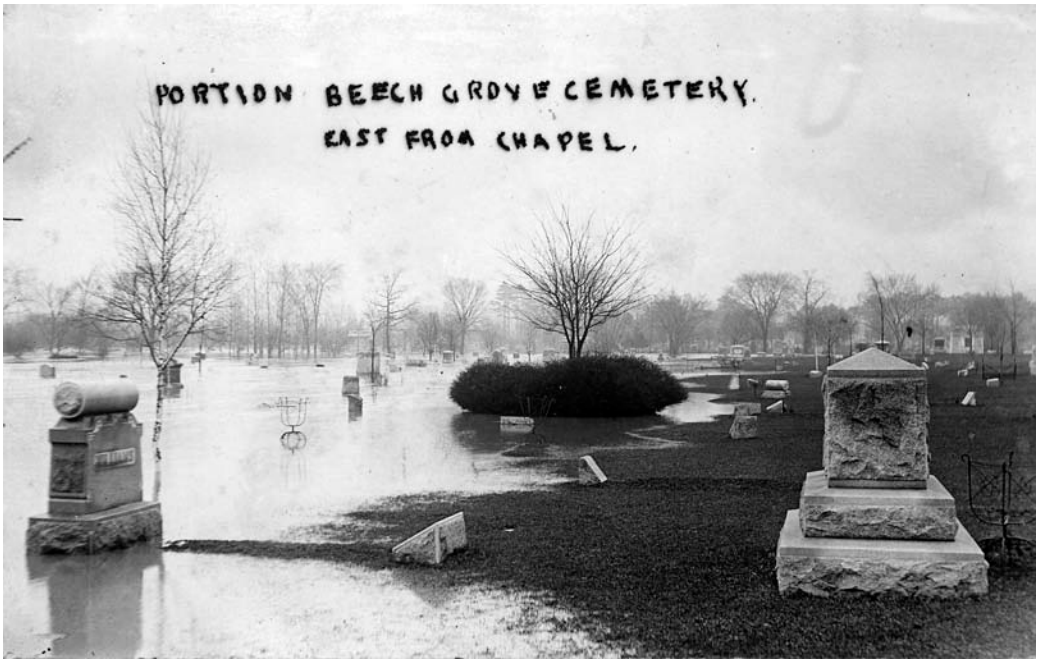
CEMETERY DISASTER PLANNING



2013

Chicora Foundation, Inc.

Is your cemetery prepared for the unexpected, such as a tornado, hurricane, earthquake, or flood? Do you have a plan to minimize damage and recover afterwards? If not, this publication can help you, your staff, and your volunteers prepare for the unthinkable.

The cover photograph is of the Muncie, Indiana Beech Grove Cemetery during the March 1913 flood. Rainfall of 6 inches to 8 inches fell in Muncie from the afternoon of March 23 through the afternoon of March 26, changing to snow late on the 26th. Accumulations reached 1 to 2 inches by the following day and the river crested at 22.6 feet on March 25th, the highest level ever recorded. When floodwaters finally receded, at least 200 Indiana residents had lost their lives. The "Great Flood" of 1913 affected the entire midwestern section of the United States and resulted in at least 600 deaths.

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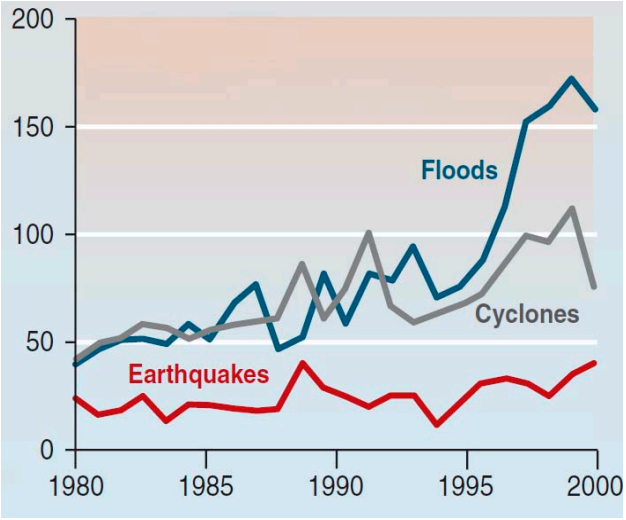
TABLE OF CONTENTS

Cemetery Disaster Planning

DOES YOUR CEMETERY HAVE A PLAN?

A 2005 study by the World Bank and Columbia University found that the number of disasters worldwide has been steadily increasing. Flood and wind events, in particular, have caused much greater economic loss.

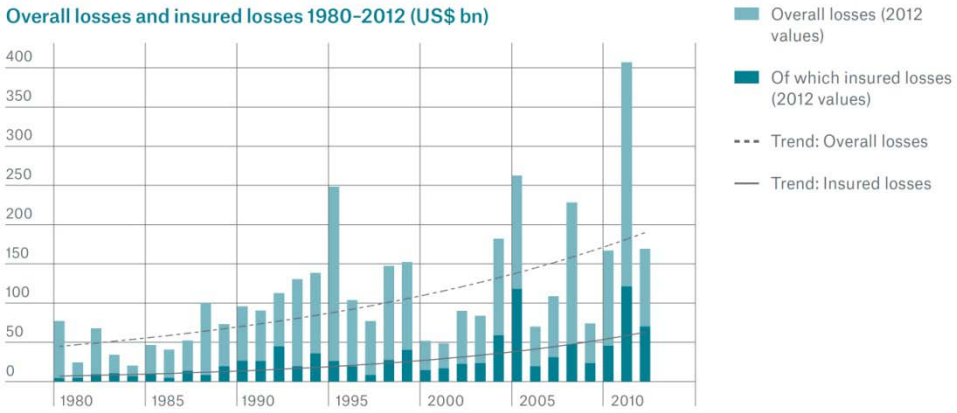


Much of the United States falls into a region identified as a "multi-hazard, high-mortality, and total economic loss hotspot." These areas will require huge amounts of future disaster relief funding.

In fact, the world's largest reinsurer, Munich Re, recently released a study showing the escalating cost of disasters – both to insurers and to those lacking insurance. Meteorological events, including tropical storms, winter storms, severe weather, hail, tornadoes, caused 59% of all losses. The other disaster classes, including geophysical events (such as earthquakes), hydrological events (such as floods), and climatological events (such as wildfire and drought) each account for between 12 and 16% of the disasters. However you look at it, the costs of not being prepared are escalating.

Cemeteries can be affected by a range of significant climatic disasters, including river flooding, hurricane winds, storm surges, tornadoes, and drought. In addition, issues such as vandalism, theft, and even homelessness can cause significant harm to the cemetery landscape.

So, does your cemetery have a plan? A plan to mitigate or minimize as much risk as possible? A plan for recovery should the unthinkable actually happen?



Chances are you don't — and that is likely to make the disaster far worse through indecision and inappropriate actions.

This brochure will help your cemetery understand the risk, take precautions, and plan for recovery. But this isn't a replacement for careful study, coordination with local emergency management agencies, or discussions with your cemetery governing board and attorney.

HOW DISASTERS AFFECT YOUR CEMETERY

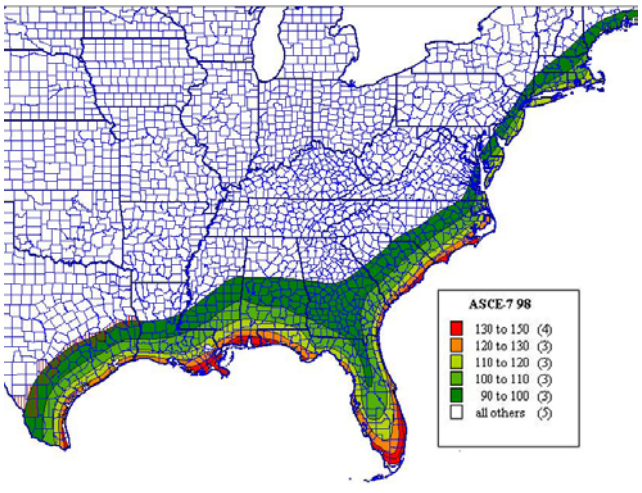
It's important to understand that your cemetery is vulnerable, as well as to realize the nature of the damage that you face. Let's examine a few of the more common disasters.

Hurricanes

Hurricanes result in wind and water damage. A Category 1 hurricane will have sustained winds of 74-95 mph. A Category 4 hurricane will have sustained winds of 131-155 mph. These winds will damage vegetation, removing branches or entire trees. They will blow other debris into your cemetery, including awnings, sheds and marsh grass. Even boats have been blown and washed into cemeteries. And the sand will scour stones. Trees will topple and crush monuments. Debris will complicate your clean-up efforts. Salt water spray will kill or damage many plants. The wind may damage structures on your cemetery's property (such as your office), as well as destroy signage. You will probably be without power anywhere from a few days to weeks.

Hurricane Katrina flooded this New Orleans, Louisiana cemetery. Water is never *just* water. It contains sewage, toxic waste, and other contaminants. It may also include large quantities of salt that will damage your stones and kill vegetation (Photo courtesy FEMA).

Hurricanes may also result in a storm surge — water pushed toward the shore by the force of the winds. Much of our coast lies less than 10 feet above mean sea level. The surge is dependent on local factors, forward speed, size, central pressure, and even the angle of approach to the coast, not just the category of the hurricane. You should consult NOAA weather forecasts for storm surge information. Pay particular attention to what are called the SLOSH (Sea Lake Overland Surge [from] Hurricanes) models. If your cemetery is in a hurricane prone area (take a look at the map below), be certain that you begin planning for hurricane season (June 1 through November 30 on the East Coast and May 15 through November 30 on the Pacific Coast).



This map shows anticipated maximum wind speeds along the Eastern Coast (Courtesy ASCE 7-98).

Water is an incredible force, weighing about 1,700 pounds per cubic yard. Structures, including mausoleums, can be destroyed by the pounding of waves. Coastal areas can experience erosion. The surge can transport anything in its way into your cemetery — including buildings and boats.

Rainfall associated with a hurricane can also cause extensive damage — building roofs can leak; the ground can become saturated allowing trees to topple; drains can become clogged resulting in flooding; and below ground vaulted burials can float to the surface.

A tornado heavily damaged this Raleigh, NC cemetery, taking down trees and crushing stones (Photo courtesy FEMA).

Tornadoes

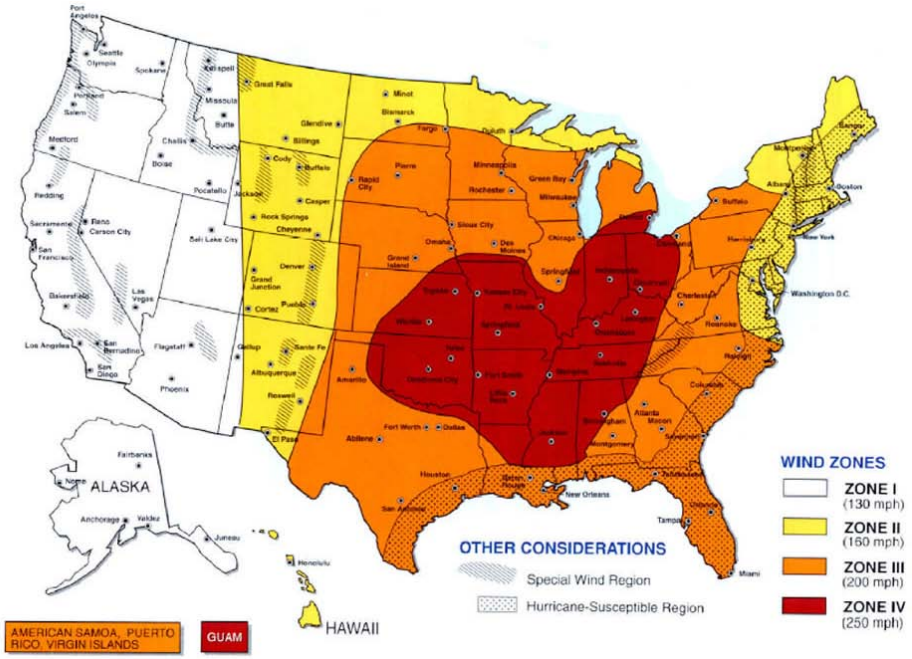
A tornado can change your cemetery in a matter of minutes. The Fujita scale classifies tornadoes into six intensities, from F0 (with wind speeds of 40-72 mph) to F5 (with wind speeds of 261-318 mph).

F0 and F1 tornadoes (wind speeds from 40 to 112 mph) account for about 69% of all such storms and typically last for 1-10 minutes (sometimes longer).

It's important to understand that a 100 mph wind results in wind pressure of about 25 pounds per square foot. For an obelisk 30 feet high that translates into a wind load of about 1,560 pounds.

You can expect an F2 tornado to topple trees and even overturn boxcars. Structures with weak foundations will be picked up and moved.

The map below identifies the more tornado prone areas in the United States.



Tornado risk map for the United States (Courtesy FEMA).

Hurricane Categories and the Fujita Scale for Tornadoes

Hurricanes		Tornadoes	
Category 1	74-95 mph; large branches will snap and shallow rooted trees may topple; extensive damage to power lines	F0	40-72 mph; light damage; branches removed from trees; shallow rooted trees topple; typically last from 1-10+ minutes
Category 2	96-110 mph; many shallow rooted trees will topple; near total power loss expected for several weeks	F1	73-112 mph; peels surface off roads; outbuildings demolished trees snapped or broken; moving autos pushed off roads
Category 3	111-130 mph; many trees snapped or uprooted; electricity and water will be unavailable for several weeks	F2	113-157 mph; roofs torn off frame houses; boxcars pushed over; large trees snapped or uprooted
Category 4	131-155 mph; most trees will be snapped or uprooted; power outages will last for weeks to months	F3	158-206 mph; trains overturned; most trees in forests uprooted; cars lifted up and thrown; weak pavement blown off roads
Category 5	>155 mph; nearly all trees will be snapped or uprooted; power outages will last for weeks to months	F4	207-260 mph; well constructed homes leveled; cars thrown and disintegrated; trees uprooted and carried away
		F5	261-318 mph; incredible damage; auto sized missiles fly through the air in excess of 300 feet; trees debarked; can last for 20 minutes or longer

Flooding

Floods can be caused by heavy rains, ice jams, rains after fires, levee breaks, spring thaw, new development, tropical storms, and hurricanes. High risk areas are those shown on FEMA flood maps as Special Flood Hazard Areas (SFHAs). These areas have at least a 1% annual chance of flooding — this is considered the 100 year flood. An area with a 0.2% annual chance of flooding is within the 500 year flood zone.

Flooding from Hurricane Ike displaced caskets and opened vaults throughout this Texas cemetery (Photo courtesy FEMA).

One study found over 40 million people live in flood prone areas, including nearly 10.5 million in coastal counties. This represents over 17 million housing units — and an unknown number of cemeteries.

Flood water can move at speeds of up to 12 mph. For each foot of flood water, 1500 pounds of an automobile's weight is displaced. This means that two feet of water has more than enough energy to send most automobiles floating helplessly downstream. Floods can also transport trees, boulders, and other debris. They can destroy underground utilities and the roads themselves.

In addition, flood waters can saturate the ground and displace caskets and vaults.

There have been multiple cases where cemeteries were flooded and caskets were displaced. As a result of the Missouri River flooding in 1993, 700 of the 1,500 graves in the Hardin, Missouri cemetery were displaced. A year afterwards only 100 could be securely identified. Nearly 150 remains were never identified.

In 1994, the flooding of the Flint River again displaced more than 400 caskets in two Albany, Georgia cemeteries. Hurricane Floyd in 1999 displaced over 200 caskets from North Carolina cemeteries. In 2005, caskets were displaced in Mississippi, Alabama, and Louisiana as a result of Hurricane Katrina. In 2012, Hurricane Isaac displaced hundreds of caskets from cemeteries in Braithwaite, Louisiana. Caskets at one cemetery were displaced as much as a quarter mile.

Other Disasters

Your cemetery may also face mudslides, wildfires, or earthquakes.

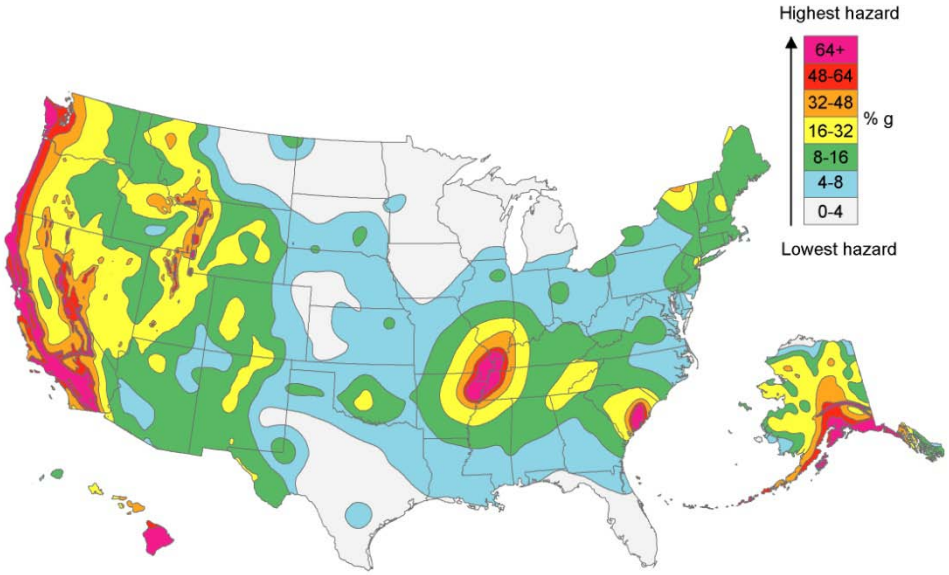
While mudslides may be caused by earthquakes or other natural events, they typically result from water rapidly accumulating in the soil, changing the earth into a flowing river of mud or “slurry.” They often occur when the vegetation holding the soil is removed, perhaps by a wildfire. A mudslide may have a density of 1.5 tons per cubic yard of debris and may travel at over 30 mph.

Wildfires may travel as quickly as 6 mph in forested areas and 14 mph in grasslands, and the fires can exceed temperatures of over 1,400°F. Temperatures in this range will affect the strength of most stones and if thermal shock occurs the stone can disintegrate. This is often seen in the cracking or spalling of marble. Obviously fire will destroy wood markers if there are any remaining your cemetery. Aluminum will be damaged by fires of only 800°F.

A cemetery that has been burned over by a wildfire showing sooting and damage to marble stones (Photo in Chicora collections).

An earthquake is the sudden, rapid shaking of the earth, caused by the breaking and shifting of subterranean rock. When many people think of earthquakes, they think California, but there are actually 45 states and territories in the United States that are at moderate to high risk of earthquakes. Earthquakes have the potential to twist and topple monuments, as well as destroy structures such as mausoleums. In the 1906 San Fransisco earthquake over 75% of the monuments in the Holy Cross Cemetery at Colma were thrown down or "twisted on their base."

This photo shows a cemetery monument twisted and partially toppled by the 1906 San Francisco earthquake (Photo courtesy *The California Earthquake of April 18, 1906: Report of the State Earthquake Investigation Commission*, Plate 80d).



Earthquake potential map for the United States (Courtesy of the USGS).

EVALUATE YOUR RISKS

The first step is to evaluate your risks – eliminate those potential disasters for which there is a very low likelihood of occurrence. If your cemetery is in the middle of a large metropolitan city, then a wildfire, while not impossible, is not a very likely event. If your cemetery is near the Gulf coast, however, preparing for hurricane events should be high on your list. If there is an active railroad bordering one side of your cemetery, then preparing for a derailment is probably a good idea.

Although you can't plan for every event, don't eliminate possible scenarios simply because planning seems too difficult. For a disaster plan to be useful it must look at the worst case events. If you're able to survive these, then everyday occurrences will pose no real problem.

Of course you should take advantage of information readily available to you. For example, visit your county's emergency management website and determine if you're located in a hurricane storm surge area (and if so, how deep the water may be). The maps provided in the previous section will help you evaluate your risk for earthquakes, hurricanes, and tornadoes. Another great site is the NOAA NCDC Storm Event website (http://www.ncdc.noaa.gov/stormevents/). Here you can input any state or county and a get a list of major weather events such as tornadoes, floods, droughts, strong winds, hail, etc. If you haven't already, it is critical that you know whether your cemetery is in a flood zone. Visit the FEMA Mapping website (https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1) to get a map of your cemetery and any nearby flood risks.

You should also take the time to look around your cemetery – view your property with a "new eye." For example, does your cemetery drain very slowly after a major rainstorm? If so, this is good indicator that you may face flooding problems and possibly dislocation of burials by water.

This cemetery shows extensive flooding after every rain – so its disaster plan should definitely cover flooding issues (Photo in Chicora collections).

What about vegetation? Have the trees in your cemetery been examined by an International Society of Arboriculture (ISA) certified arborist to look at hazards and pruning needs?

What about your roads? Would they be passable in the event of flooding, or snow, or if there were downed trees?

Also, have you assessed your stones for possible problems? For example, are obelisks attached using pins or are they liable to topple in the event of a wind storm? A stone-by-stone assessment by a stone conservator will provide you with detailed information concerning the condition of your stones prior to a disaster.

Finally, you need to evaluate your ability to recover. Do you have a trained staff or does your cemetery survive only using volunteers? Do you have funds set aside to help in the event of a disaster? You need to honestly, and carefully, evaluate not only the risks your cemetery may reasonably face, but also its ability to weather – and recover from – those events.

GETTING READY

Trees

It's a very simple fact: the higher the winds, the greater the damage to trees. With winds less than 100 mph you can expect damage to about 10-15% of your cemetery's trees. As the winds approach 135 mph the damage will jump to 25% of your trees. As winds exceed 150 mph you may see damage to 40% or more of your cemetery's tree cover.

But, we have also learned some lessons in urban forestry that may help. Trees growing together fare better than isolated trees. It is also useful to plant a variety of species, ages and layers of trees and shrubs to maintain diversity in your community.

This photo shows the damage trees can do when improper maintenance is mixed with high winds. Not only can monuments be damaged or destroyed, but human remains may also be exposed (Photo courtesy FEMA).

Most importantly, we know that some trees do better in high winds and heavy rainfall than others. For example, the trees with the best wind resistance include the dogwood, American holly, yaupon holly, crape myrtle, southern magnolia, turkey oak, myrtle oak, and live oak. Trees that don't perform quite as well, but still have generally good wind resistance include sugar maple, river birch, pignut hickory, mockernut hickory, white ash, sweetbay magnolia, water and black tupelos, and post oaks. Of course, some of these trees have other undesirable characteristics for cemetery landscapes, so you must choose carefully. For example, the white ash has surface roots than can pose a problem in a cemetery and almost all of these trees have fruit, twigs, or foliage than can cause significant litter and add to maintenance requirements.

While not suitable for all locations, sabal palms seem to perform well in hurricane winds – but avoid queen and Washington palms.

Trees that have very low wind resistance – and that should be avoided in tornado and hurricane prone areas – include pecan, tulip poplar, Bradford pear, southern red oak, laurel oak, water oak, sycamore, southern red cedar, Carolina cherry laurel, and Leyland cypress.

Pines may seem initially to be doing well after strong winds, but decline and die 6 months to 2 years later. This is perhaps the result of hidden damage resulting from bending and twisting during strong winds, or perhaps from the loss of smaller roots. Regardless, be prepared for the loss of pines within a few years of the event.

Another important lesson learned is that the loss of leaves doesn't mean that the tree will also be lost. For example, live oaks will lose their leaves in wind storms, but this strategy may allow the tree to better survive. Within a year leaves will come back and most live oaks survive.

Studies are showing that old trees don't perform as well as younger, healthy trees. Just like people, as trees age they become more susceptible to disease and other problems. This means it is critical to have ISA certified arborists periodically inspect the trees in your cemetery and evaluate trees for their hazards, such as structural defects. Overly mature trees that present hazards should perhaps be removed and replaced by new trees. It is critical that diseased or damaged trees be removed by certified arborists before they are taken down during a wind storm event – along with your monuments!

It is also crucial that you have your cemetery trees correctly pruned. One study found that survival for pruned trees was 73% compared to 47% for unpruned trees, showing that overall, pruned trees are less likely to fail in hurricanes.

Other factors can affect the survival of your cemetery's trees. For example, soil compaction results in a greater likelihood that trees will topple during a wind storm. Damaged root systems – from road construction and even from allowing burials too close to old trees – will also result in greater instability and a higher potential for failure. Never cut roots closer than the distance of 5 times the trunk diameter.

Other Vegetation

Although wildfires are more common in some areas than others, in the event of a drought any cemetery can sustain damage from a wildfire. One of the most critical preparedness steps is the control of vegetation. Under ideal circumstances you should have a 30-100 foot buffer around the cemetery to prevent fire intrusion. This, however, is often impossible to achieve. But what you can do is make certain that leaves and dead vegetation are periodically removed. If there is a cemetery office, a 10-foot buffer is appropriate; gutters should be keep clear of debris; propane tanks should have vegetation removed for at least 10 feet around them; ⅛-inch screen in vents and any openings under the structure will help eliminate cinders from gaining entrance; and plan for possible water needs.

While there are no "fire-proof" plants, some offer greater resistance than others, such as rockrose, iceplant, and aloe. Shrubs that offer fire resistance include hedging roses, bush honeysuckles, currant, cotoneaster, sumac and shrub apples. Hardwoods, such as maple, poplar, and cherry, are better choices than conifers, especially pines. Tree branches should be pruned at least 10 feet up to reduce the fire load.

Drains

Drains are intended to help move water out of your cemetery. They can't achieve that function if they haven't been cleaned in generations. Drain inspections and cleaning should be an annual activity. Many plumbing companies can provide closed circuit TV or video inspection that allows problems, such as clogs or pipe failures, to be quickly identified. Repairs can target these problems and cleaning may involve water jets as well as mechanical cleaning using grinders or chain flails. Open drains, too, must be periodically examined and soil removed.

An example of a cemetery drain that should be cleaned to help prevent flooding (Photo in Chicora collections).

Dangerous Monuments

Just as you should examine your trees for hazards, you should also examine your monuments. If you have had a stone conservator do a stone-by-stone assessment, you will already have a list of unsecured or leaning monuments that should receive a very high priority for repair.

Otherwise, spend some time on your grounds gently testing monuments for their stability. Use an angle finder to evaluate how much stones (like obelisks) are leaning. Greater than 5% and you should consider the threat they pose to your workers, the public, and other stones.

A 12 foot obelisk is being reset after drilling and insertion of a pin to prevent it from being easily toppled (photo in Chicora collections).

It is helpful to understand that many monuments were (and continue to be) set with no pins to prevent their shifting or toppling. The use of setting compound is not adequate for large or top heavy monuments. In addition, setting compound dries out and loses effectiveness after just a few years. Pinning, using stainless steel or fiberglass, will help prevent monuments from being displaced by either nature or vandals.

A Lot Depends on Your Staff

As you get ready to respond to disasters, much of your planning will depend on your staff and it is critical that you are honest with yourself.

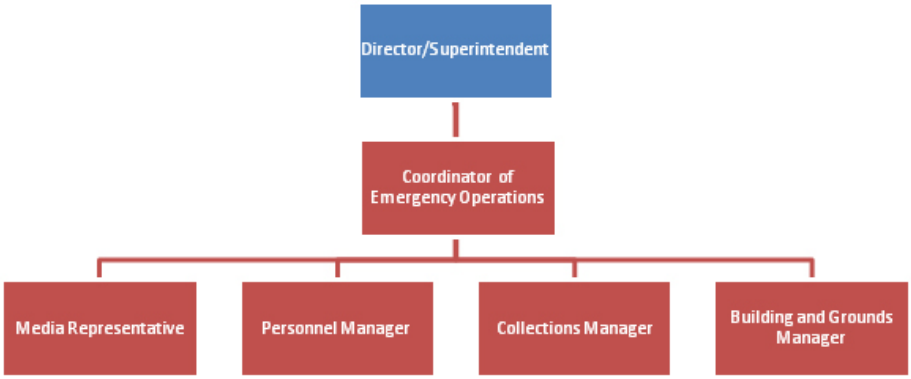
Does your cemetery have a large and trained staff? Do you have access to other resources and staffing (perhaps in different municipal departments)? Does your cemetery have only a very small or part time staff? Does your cemetery largely rely on volunteers?

These are critical issues since you must have labor to not only respond to a disaster, but also to prepare for events and mitigate the possible effects.

Assuming you have a maintenance staff, whether municipal, county, state, church, or private cemetery, you should explore how quickly they could respond to disaster needs. How many staff can you count on showing up after a disaster, how well trained are they, how much equipment can you readily obtain? Determine how you will allocate staff, as well as identify not only needed training (perhaps chainsaw safety or simple monument resetting), but also the additional equipment you will need (perhaps 4x4 utility vehicles, chain saws, barricades, radios for communication, power generators).

Determine if your maintenance staff could reach the cemetery from their home base. For example, will the roads they need to drive to reach the cemetery likely be open in the event of a regional disaster? Will they have the identification they need to enter a disaster area that might be cordoned off by the National Guard to prevent looting or other problems? Will you have any way of reaching them should telephone lines be down and cellular communication impossible?

Explore the possibility of using day labor to assist in the recovery. There are multiple responsible and well organized companies that provide trained staffing compliant with labor laws and fully insured. It may be worthwhile to contact them ahead of a disaster and set up an account that would allow you quicker access to additional assistance.



Another critical staffing issue is the chain of command. Most fundamentally, who is in charge? Who is responsible for securing the cemetery, setting recovery goals, setting recovery priorities, making contact with recovery and regulatory agencies, public relations and the local media, and ensuring communication among staff?

The person in charge may, or may not, be the cemetery's director. The cemetery director may not be suited. And even if the individual is, who is in charge if the director isn't present? A good chain of command – assuming the institution is large enough – should have a media representative, a personnel manager, a collections manager, and a building and grounds manager. All should report directly to the Coordinator of Emergency Operations for your cemetery.

The media representative should be the only individual making public comments. The personnel manager should be the individual responsible for allocating or providing staff resources, including outside vendors and contractors. This individual should also be responsible for keeping track of hours worked, pay schedules, and related documents that will be demanded by insurance or FEMA. The collections manager should be responsible for inventorying and tracking damage to the monuments and mausoleums. This individual should establish conservation and repair priorities. Finally, the building and

grounds manager should be responsible for trees, lawns, fountains, roads, and other softscape and hardscape features in the cemetery.

Training

Make certain your staff is prepared. Does everyone know how to use a portable fire extinguisher (and are they properly installed in your office, in vehicles, and on riding mowers or other equipment? Is staff trained in the proper use of chain saws (and have you provided the appropriate safety equipment)? Does staff know where the main water disconnect is for your cemetery? If you have an office, does staff know where the electrical and gas disconnects are located – and how to use them?

Budget Considerations

If your cemetery is eligible for FEMA disaster funding, remember that it is cost reimbursable. You must first fund the recovery and then submit proof of expenditures. If your cemetery isn't eligible for FEMA funding, you must still have the money in pocket to respond. Are you financially prepared?

If you don't have a reservoir of ready cash, what are your options? Do you have major donors to whom you could appeal? Perhaps it would be wise to begin an escrow account for emergencies – a "rainy day" fund.

Equipment and Supplies

Have you discussed the equipment you have, or may need, for different types of local and regional disasters? Remember that you need recovery equipment for the cemetery grounds, the office and maintenance buildings, and any mausoleums that may be present. Keep in mind that while equipment may be present, for example in the maintenance building, what will happen if the structure flooded by rain or destroyed by an earthquake? The list below provides a few items for your consideration.

List of Possible Disaster Supplies for a Cemetery

- One or more weather radios
- Lightning detectors for grounds crew
- Flashlights (and batteries)
- First aid kits (OSHA compliant)
- Potable water (1 gal/person/day)
- Gloves
- Rain coats
- Rubber boots
- Fire extinguishers
- Weather radio (and batteries
- Communication radios
- Digital camera (and several memory cards)
- Plastic sheets
- Duct tape
- VHF or UHF work site radios
- Tarps
- Disconnect tool for water and gas lines
- Disinfectant
- Generator
- Gasoline safety cans
- Extension cords
- Fans (for office)
- Wet/dry vacuums
- Hoses
- Water pumps (and hoses)
- Wheelbarrows
- Buckets and mops
- Cemetery plans
- Administrative paperwork
- Phone lists
- Hand tools (shovels, rakes, brooms)

Keep in mind that FEMA does not reimburse equipment purchases, although it typically will cover rental costs. The question is, however, whether in the event of a major disaster you will be able to identify rental equipment.

Pre-Establish Contacts

Many cemeteries without major municipal support will require outside contractors, possibly including:

- A stone conservator,
- ISA certified arborists,
- Rental companies,
- Recovery firms for your office or records,
- Additional labor, and
- Trash haulers.

During a disaster all of these individuals or firms will have multiple demands. Many may even have been affected by the disaster themselves. It may be difficult or impossible to make phone contact.

You must establish a relationship with each, *before the disaster*. This means getting to know owners, obtaining private cell numbers, finding out what is available in your local community and what you may have to go out of your region for, perhaps even signing an agreement with particular service providers ahead of time.

Example of an obelisk damaged during a severe storm, repaired by the cemetery maintenance staff without benefit of a professional conservator.

This kind of disfiguring and inappropriate repair can only be avoided by ensuring a stone conservator is called in after a disaster (Photo in Chicora collections).

You should also determine how current service providers might respond to disasters in your area. Talk to your local telephone company, utility companies, cellular provider, and others about their disaster plans, prospects for quick recovery, or other problems that might affect you. If you can't get this information from them directly perhaps you can get the information – or at least reasonable advice – from your community Emergency Services Director.

Make certain that your phone list with information about your contractors is included in your disaster response supplies – and be certain to update the list yearly (people and phone numbers change).

It's also a good idea to make contact with your local law enforcement. Find out what district your cemetery is in and who routinely patrols the area. Find out who you will need to contact in the event of vandalism, a local disaster, or other problems. Ask the officers on patrol to visit your cemetery to learn more about its settings and concerns.

Inventories and Mapping

It is critical to know what you have in order to evaluate what has been damaged or lost. Moreover, if you don't know what a monument looked like before it was shattered, it may be impossible to either repair the damage or have an identical monument created.

Inventories should include complete transcriptions, measurements, baseline information on the monument's condition, and most especially photographs of the monument. This information can assist with insurance or FEMA requests, it can be used by families seeking to make a claim against their own insurance, and it can help you determine the best response to damage.

Digital photos have gotten so good that today even the National Register of Historic Places allows their use. But, it is critical that you have photos of adequate quality. The table here establishes some minimal standards for the digital photographs you take of your monuments.

Minimal Specifications for Digital Photography

	Best	Acceptable
Camera	6+ megapixel	2-5 megapixel
Image File Format (set camera to highest quality)	TIFF or RAW	JPEG converted to TIFF prior to any modification
Resolution	6+ megapixel at 300 dpi (2000x3000 pixels)	2 megapixel at 300 dip (1200x1600 pixels)
Labeling Images	Use standard system	
Storage	Archival Gold, CD-R or DVD-R	Commercial CD-R, DVD-R
Disk Labels	Non-adhesive laser printing	Hand-written on clear hub using photo pen

Mapping is equally important; it will be needed during the assessment to identify where damage has occurred. It can be used to indicate the extent of damage. It will be necessary to show contactors where repairs are needed or where trees must be removed.

Your mapping should include monuments; buildings; roads; major trees and plantings; and utility lines, especially water or sprinkler lines as well as buried electrical lines. While you may have digital copies (such as GIS maps), you still want paper-based maps for immediate use after the disaster when electrical service may be interrupted.

Storage of Critical Data

Many cemeteries have a variety of critical data, such as inventories, maps, owner records, business records, financial information, and employee files, on computers. Most cemetery superintendents would agree that these records are critical for their operation. What would happen if all of this information were lost overnight?

It is critical that computer information be backed up. Three issues you must consider is how often the files are backed up, where the back ups are stored, and how easy it will be to reinstall lost files. Don't forget that data without software does you little good; so be sure you safeguard your operating system and program software – all will need to be reinstalled as part of the recovery process.

Ideally, files should be backed up daily. This become especially critical if your cemetery is large and does a great deal of business. Small cemeteries may feel secure backing up their data weekly or perhaps even monthly.

While having the data on a server down the block may be adequate in small, localized disasters, it won't be sufficient in the case of a hurricane or tornado. There are a variety of data vaults and even cloud storage that may be appropriate for your particular situation. Just verify security and, especially, how easy it will be to get your data re-entered and ready for use. For

example, some commercial on-line options are inexpensive, but reloading data can take days – dramatically impeding your ability to recover after a disaster.

If there is time, you can remove critical computer equipment from areas thought most vulnerable, but this should be done after all other preparations have been completed – computer equipment today is so inexpensive that you shouldn't devote critical time to its removal . Good storage locations onsite during a hurricane include corners of rooms or rooms without windows. You may also want to double wrap equipment in plastic bags – but remember that these bags will promote mold growth and should be removed as soon after the event as possible. Equipment should be unplugged to prevent damage from power fluctuations (of course, using an uninterruptable power supply is always critical and will help minimize this problem).

The use of portable generators after disasters is commonplace, but not all generators are suitable for use with computers and similar delicate electronics. Most older generators produce what is known as "dirty power." This is some type of abnormality, such as a surge, spike, transient, fluctuation, or noise that can damage sensitive electronics. The use of a high quality uninterruptable power supply (UPS) is critical under such circumstances. There is a new generation of inverter generators which produce cleaner power and these may be preferable. They are, however, fairly expensive. You should consult your IT contractor for additional information.

Loss of Human Remains

Generally, recovery and identification is the responsibility of Disaster Mortuary Operational Response Teams (DMORTs), part of the Department of Health & Human Services. But the responsibility may also fall on local law enforcement (in 1994 the Georgia Bureau of Investigation was responsible for attempting to resolve the problems resulting from the Flint River flooding) or the local coroner.

A storm surge in 2005 exposed burials in Alaska. This is an example of when bioanthropological assistance would be critical (Photo courtesy FEMA).

Regardless of who takes lead, the cemetery must be prepared to provide records concerning burial locations. Some cemeteries keep information on the type of casket buried, and some caskets contain vials with paper information (although these don't tend to survive long). Today, most caskets have serial numbers, but not all funeral homes routinely associate a client with a specific serial number.

As part of your planning, it is important to contact local funeral homes to ascertain if serial numbers are routinely recorded and whether the information will survive a disaster.

BEFORE THE EVENT

What you do before the event depends on the warning you have. For some disasters, such as a train derailment at the edge of your cemetery, you may have no warning at all. For a tornado you may have only 13 minutes. For a hurricane or flood you may have 24 hours or more. Each event is different, but what you do immediately before the event can make a significant difference in the survival of your cemetery.

Little or no Warning

For these disasters you must place your confidence in your planning process.

For example, in the event of a train derailment along a boundary with your cemetery, your pre-planning should have included emergency contact numbers for the railway operating the tracks, the 24/7 emergency phone number for Chemtrec (800-424-9300), and local emergency phone numbers, including the phone number of the rail yard superintendent. Your plan may also ensure that your staff has one or more copies of the Department of Transportation Emergency Response Guidebook (ERG). Always notify your local emergency response agency, but these steps will also allow you to quickly notify the proper rail line, and to determine the toxicity of any chemicals present and a safe evacuation distance.

For a fire in your office, your pre-planning should have included training staff on using portable fire extinguishers, making certain staff knows to immediately call the local fire department, and ensuring that you have properly backed-up critical documents like maps and plot information. Your preplanning will also have included the preparation of a fire emergency plan , as well as conducting periodic fire drills for your staff.

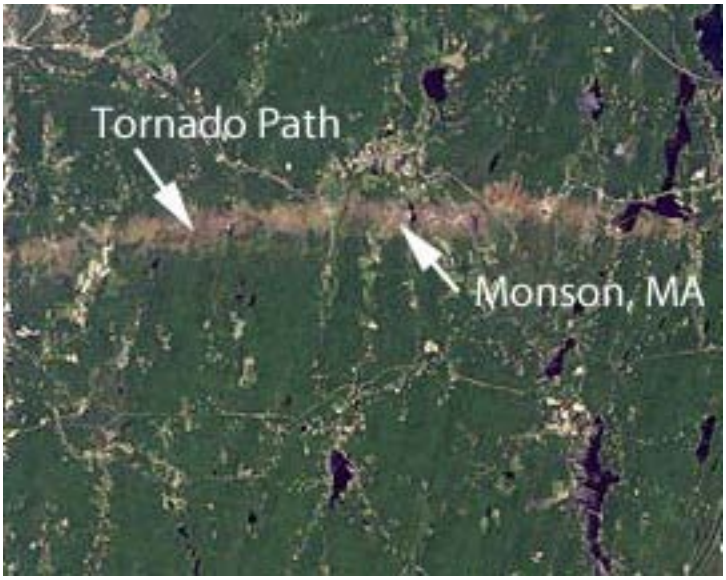
This is one technique for securing iron gates to gate supports using stainless steel cable. This makes theft more difficult, while still allowing the gate to be operable (Photo in Chicora collections).

For vandalism, your pre-planning should have included hardening as many targets as possible (locking ironwork gates, securing loose stones or iron fence parts); ensuring that all monuments and fences are completely documented; ensuring that monuments are not easily toppled over; as well as making certain that damage is quickly identified, reported to law enforcement, and repaired.

Although it is true that there are many disasters for which we have little or no warning, that doesn't mean we must become victims – preplanning should help ensure that many events are little more than inconveniences.

Minimal Warning

A good example of a disaster offering only minimal warning is a tornado. The average tornado warning sounds 13 minutes before touchdown. What can be done in 13 minutes? The first priority must be human life – you need a system of alerting staff on the cemetery grounds, perhaps a compressed air horn. Staff must also know a safe area in which to take refuge. Other advanced steps, such as pruning trees and checking monuments for stability may reduce the overall damage.



In 2011 Monson, Massachusetts was hit by a rare 160 mph tornado that left this distinct scar on the landscape. Involved were two cemeteries. Both were repaired by Chicora using FEMA funds.

Thunderstorms also offer minimal warning, but again there are steps you should be taking in advance. For example, there are today several brands of portable lightning detectors than can advise your staff of lightning strikes anywhere from 40 to 75 miles distant. While the average forward speed of thunderstorms is about 30 miles per hour, some may travel as quickly as 70 miles an hour and lightning can strike 10 miles distant from the actual storm cores. So it is critical that your staff know when to stop mowing and seek cover. As part of your preplanning you should also have identified significant trees in your cemetery that should be protected by ground rods.

With Adequate Time

When disasters more slowly evolve, as in the case of hurricanes, many floods, and some wildfires, you have the opportunity to call together staff and quickly go over the disaster plan, reminding everyone of their responsibilities. You can also assign additional tasks, based on current operations in your cemetery.

With time, you should review your cemetery and determine if there are cemetery furnishings that should be put under cover. You can decide if it is appropriate to remove mowers and other tools, or perhaps decide if there are better places to park cemetery vehicles to prevent their flooding or wind damage. You may also want to secure the cemetery gates and post signs indicating that the cemetery is closed because of the upcoming event. It may be appropriate to change the voice mail on the phone. You may also wish to notify local law enforcement, letting them know that the cemetery is closed. If you have an office with a security system, you should plan on calling them as well. Your plan may also call for the off-site storage of original business records.

For operating cemeteries another issue is deciding when to suspend burials, especially if your crew is responsible for opening and closing graves. While it is important to provide community service, this must be balanced against appropriate preparedness. It may be that your staffing is simply too tight to permit burials; you may want to provide local funeral homes with a notice of how you will respond to disasters such as hurricanes so they can also be prepared.

AFTER THE EVENT

However much damage the disaster causes, additional damage can occur if you fail to implement your disaster plan effectively. Miscommunication or no communication, random actions, poor explanations to the public, financial collapse, inadequate staff, and inappropriate repairs are all probable without a plan or if the plan is not followed. So it becomes critical that you rehearse the plan and that staff understand their roles and responsibilities.

First, Safety

Before anything else is done, it is critical that you determine the cemetery is safe. This should involve the structural stability of the office, the presence of downed electrical lines or broken gas lines, water flowing so swiftly or so deep as to cause a hazard to movement around the grounds, and water contaminated with sewage and chemicals. After wind events it is particularly important that staff are trained to be on the lookout for what OSHA calls “widowmakers.” These are broken limbs that are hanging freely in trees and therefore pose a risk to equipment and personnel working under or around the tree. An equal concern specific to cemeteries is the possible presence of monuments that might be unstable.

Downed electrical lines are another safety issue. No work should be conducted until the utility company certifies that all lines are safe (Photo in Chicora collections).

Another safety issue to be aware of are damaged graves. Soil may be soft or depressions may be covered by tree limbs and other debris. During the 1994 Albany, Georgia floods, a large sinkhole opened in one of the cemeteries, collapsing a number of graves into a large pit.

Of particular concern are damaged or open vaults, or caskets that may have floated out of the ground during floods. Staff should not attempt any recovery prior to notifying the local coroner or other civil authority. All remains should, however, be secured. This may require additional security if local law enforcement is not able to deal with the situation because of other recovery efforts.

Some storms bring other dangers, such as snakes and rodents. Others may result in harsh working conditions, such as heat and humidity during the summer or extreme cold during the winter. Be certain that your staff or volunteers are up to the extremes and that you are prepared, for example with water during the summer and a place to warm up during the winter.

Documentation

Another critical first step is thoroughly documenting all aspects of the disaster. This is relatively easy if the problem was localized (such as a downed tree), but may be more difficult if the disaster is more involved (such as a tornado path through your cemetery). You will have to quickly determine whether the documentation can be handled in-house or if you need to contract with an outside source, such as a conservator.

Using a digital camera you will want to document any downed trees or evidence that the trees disturbed graves or exposed human remains. You should also document all downed or damaged monuments. It will also help if you include color bars (to help calibrate printing and ensure accurate colors), as well as a scale. It is often necessary to take multiple photographs to ensure that the full extent of the damage is documented.

Example of a "widowmaker" in a cemetery. This dead branch is a disaster waiting to happen and requires immediate removal (Photo in Chicora collections).

Chicora conservators, funded by the National Trust for Historic Preservation, were called in to inventory tornado damage just 24 hours after this devastating tornado in Americus, Georgia (Photo in Chicora collections).

These photographs are essential for insurance purposes, may be useful in documenting the extent of damage to FEMA, and can be sent to stone conservators to obtain repair estimates. They also help provide documentation of the disaster for publicity, to send plot owners, and to present to governing authorities when requesting additional funding.

You really can't take too many photographs and fortunately it is far more affordable to do so with the advent of digital photography. Be certain that you have a digital camera readily available, along with multiple memory cards. Each filled card should be carefully stored until the photos can be downloaded. It will also be helpful to write down what each photo is so that weeks later you can be certain what you're looking at.

An equally important aspect of documentation is a paper (or computer) record of damage. Fortunately NCPTT has developed a "Rapid Cemetery Assessment Form," downloadable from http://ncptt.nps.gov/wp-content/uploads/Rapid_Cemetery_Assessment.pdf. The benefit of this form is that it can cover a cemetery, a plot, or a grave; it incorporates architectural, fence, and monument elements, as well as landscape. Because it forces choices, it can be used by relatively untrained individuals (although training will certainly improve the generated information).

Road Clearing

One of the next steps must be opening cemetery roads since these will be critical not only to the restoration of daily activities, but also for additional clean-up measures. Several issues must be considered.

One of the first issues is security. It may be appropriate to keep your gates (if they exist) closed to prevent a flood of curious onlookers. These individuals may get in the way of or be injured by recovery efforts. They certainly pose a liability to your cemetery. In addition, you want to avoid having individuals capitalizing on your cemetery's problems by stealing ironwork, monuments, or stained glass. If your institution has no gates, then you want to install temporary fencing or barricades. You may also need to establish security patrols in your cemetery until it is possible to reopen.

You must also consider whether your roads (and bridges, if present) will support the trucks and equipment being used. Roads may already be compromised by the disaster. Even if sound, they may not have been constructed to support the weight of heavy equipment and logging trucks. Inappropriate recovery equipment might actually cost you additional funds for the repair of cemetery roads.

It may also be necessary to coordinate the removal with the local government, which may have established special areas to receive disaster trash. If yours is a governmental cemetery, it may be placed rather low on the recovery list – an issue you should incorporate into your pre-event planning.

Grounds Clearing

If the disaster requires grounds clearing, additional issues must be considered. Among the first is that the disaster may have exposed human remains. It may be that such exposure will require you to notify the county coroner. Regardless, these are bioanthropological resources and may also require the assistance of an archaeologist or forensic anthropologist.

Clean-up resulting from massive tornado damage at a Georgia cemetery (Photo in Chicora collections).

No root balls should be removed until they have been evaluated and determined not to include human remains.

Who you select for tree removal is important for a variety of reasons. It is critical that your selected firm is fully insured and their employees are covered by workers compensation insurance. Without such insurance not only could your cemetery become responsible for injuries, but there would be no recovery of costs associated with any monument damage.

Some organizations, such as ISA, have certifications specifically for tree climbers and workers. Such certification focuses on climbing and rigging, as well as safety issues.

You should carefully discuss the removal process with the selected firm, making clear the value of the monuments and the requirement that no additional damage be done to the cemetery. In some cases it may be necessary to actually place cribbing or some form of protection around the monument to provide additional protection during the recovery process.

Here a delicate monument has been protected by boxing to prevent any damage (Photo in Chicora collections).

The use of heavy equipment should be avoided while the ground is still soft from rains or flooding. Under no circumstance should heavy equipment be allowed to operate on top of graves. Not only is doing so disrespectful, but it is also likely to damage monuments and perhaps even crush brick vaults or caskets.

One way to minimize damage is to cut trees to sizes where heavy equipment isn't required. Cut downed trees so that smaller equipment can easily move them. While there are turf tires for equipment, tracked equipment tends to cause less damage on lawns. However, any equipment will damage turf if turned suddenly or the ground is still wet.

Even light duty equipment must be operated with care and precision. No operator should be in such a rush that additional damage is done to the cemetery and its monuments.

You may also want to consider the option of chipping as much of the downed vegetation as possible. Not only will this reduce your trips to a landfill and the associated cost, but it will create a ready mulch pile for your cemetery.

Another issue to be aware of are the hazards associated with stump grinding. Not only is the equipment heavy and prone to causing damage in soft turf, but it results in throwing projectiles across the cemetery (which is why the operator stands behind a safety shield when a commercial model is used). It is particularly prone to causing damage if the tree grew into or adjacent to plot coping or a monument. If you must grind stumps, you should consider a smaller non-commercial grinder. Being smaller, it has the potential for far less damage (although it is slower and less powerful).

As an alternative to stump grinding, you should consider leaving the stump in place. The tree should be cut as close to the ground as possible, preferably 1-2 inches above the soil line. The stumps should then be drilled using at least a 1-inch bit, as deeply as possible. The created holes should be filled with water and a very high nitrogen fertilizer. The stump and the area around it should be kept as wet as possible. There are commercial stump removers that are used in a very similar manner. Most contain potassium nitrate, although some use sodium metabisulfite, a chemical used in paper mills to break down the wood pulp. These chemicals will speed the decay, but it will still take time and you will need to periodically fill stump holes with soil.

Some stumps, once cut, will send out new shoots, a process called “suckering.” Examples of suckering trees include maple, cottonwood, Lombardy poplar, black locust, willow, Russian olive, and Tree of Heaven. While consistently cutting the suckers will eventually kill the stump, few cemeteries have the staff for this approach. A more efficient tactic is to immediately paint a brush-killer type herbicide on the newly cut stump so a fair amount is on the ring of cambium all around the outside just under the bark. Suitable herbicides include those with triclopyr, glyphosate, or a combination of picloram and 2,4-D as their active ingredients. This may need to be done several times before the roots die and suckers are no longer a problem.

Some cemeteries have been able to sell downed timber, although generally softwood is suitable only for pulp. Hardwood may be too damaged to have a value. Nevertheless, cemeteries may wish to explore this issue prior to a disaster to be better informed.

Monuments

Just as the grounds require detailed attention in the recovery effort, so too do the monuments. Ideally your cemetery has completed a stone-by-stone recordation so you have information about the size and condition of every monument prior to the disaster. You should also have a pre-event photograph. If so, your recovery will be greatly aided. You should inventory all toppled or damaged monuments, minimally collecting a high resolution photograph along with a narrative description.

If the monument is broken, all fragments you can find should be bagged and placed in storage with clear identification information. That identification should consist of a plot and stone number, if such a system is used in your cemetery; otherwise, you should at least record the name(s) on the monument. Redundancy is essential, so you should include the information inside the bag using an aluminum tag or Tyvek® paper label, while the outside should be labeled using another Tyvek® label or perhaps using an indelible marker.

You should immediately consult with a stone conservator to determine which monuments are suitable for repair by local monument companies or your cemetery staff (such as simple resets) and which monuments will require professional repairs. You should solicit a cost for the work, so you can either notify FEMA or your insurance company, or begin fund raising. In some cases there may be local plot owners with insurance.

What you should never allow is untrained volunteers or cemetery staff to begin “repairing” stones using inappropriate materials such as construction adhesive, bathtub caulk, or hardware store epoxy. Such repairs cause far more problems than they resolve – and they make professional repair far more expensive.

You may also wish to retain a conservator to perform the damage assessment, or have the conservator monitor activities such as tree removals to help ensure that no additional damage is done to your cemetery.

All of these fragments should be collected and inventoried in order that the monument can be appropriately repaired (Photo in Chicora collections).

Insurance

Every cemetery should explore their cemetery needs with a qualified insurance broker and attorney. Caregivers should consider their liability should a visitor fall as a result of crumbling steps, unsafe plot coping, or a collapsing grave. There is also potential liability should a monument fall and injure a visitor. Perhaps a visitor is struck by a falling tree or branch. Perhaps they sit down on a decayed wooden bench and injure themselves. If the cemetery is regularly used by the homeless, there may be additional liability. All of these are potential disasters and should be covered by your cemetery insurance. But are they?

If your cemetery is still active, then the insurance required is even greater since it should cover issues such as accidentally damaging graves, improper burial, mixing up caskets, losing burial locations, OSHA violations during grave excavation, and even the “mental anguish" resulting from improper actions.

If your cemetery has an underground storage tank – perhaps to store fuel for your equipment or perhaps an old tank that was used by the office for heating fuel – then there is additional liability and the possibility of a leak that could cause extensive environmental damage.

If damage is caused by an insured individual – perhaps as a result of an automobile accident where a vehicle runs into your cemetery, damaging monuments – then your cemetery should pursue compensation from the at fault individual’s insurance company. Of course, you must be aware of the accident and pursue the issue – meaning you must inspect your grounds and take immediate action when there is a problem.

Some large, national church organizations also offer cemetery insurance to their members at a low cost – and this coverage includes repair of damaged monuments. You should explore whether such coverage is available to you.

Regrettably, most governmental cemeteries are “self insured.” This is supposed to mean that funds are set aside to cover reasonably anticipated events. Too often it means only that if there is problem, an effort is made to cover the cost with existing appropriations and within the existing budget. Often, being “self insured” is the same as not being insured at all.

In some states governmental groups have banded together to share the responsibility for normal claims expenses on a pooled basis. This results in lower overall costs – as long as no significant regional event affects a large number of members

at one time (for example a hurricane or earthquake). These can be complex policies and if your cemetery is covered under such a pooled agreement, you should be certain what is and is not covered.

A few states have insurance specifically designed for cemeteries and may even offer vandalism insurance to non-profit cemeteries (one example is New York). In other states, legislators specifically prohibit cemeteries from insuring the stones, placing the burden squarely on their owners – no matter how many generations removed (Florida is one such example). Almost all states that have perpetual care laws exclude monuments from what cemeteries are responsible for.

The *Extension Agent's Handbook for Emergency Preparation and Response* provides a simple primer for homeowners regarding the usefulness of typical policies for disaster recovery. It notes that most polices cover cemetery plots or burial vaults that an individual owns. That's the simple answer. More specifically, if individuals have a policy written using the ISO ho3 version 2000 (a pretty standard homeowner policy), they are provided up to $5,000 coverage (included in the contents limit, not additional), as long as the loss resulted from one of the 16 named perils included in Cov. C (coverage of personal property). Thus, while vandalism and theft are included, damage from flood would likely not be covered.

Regardless, insurance provides only limited assistance to families that can be identified and are willing to file a claim. Moreover, not all policies provide this coverage. It also would likely not apply to statuary or stained glass in a mausoleum, which might only be covered under a fine arts policy. Additionally, if a family line has died out, there are no descendant families, and therefore no insurance at all.

Just because there is no insurance, are you going to allow monuments to remain toppled and broken? Hopefully not since this degrades your cemetery, reducing its historic significance, beauty, and value to the community. Part of your disaster plan must cover how your cemetery will fund appropriate repairs.

FEMA

It is critical that cemetery caregivers understand what FEMA will – and won't – fund, as well as how the process works. The time to learn about FEMA is before, not after, a disaster. We hear a lot of complaints regarding FEMA that are based on unrealistic expectations.

FEMA becomes involved in a disaster only if the governor requests federal involvement – and that involvement is county-specific. There is also a difference between a major disaster declaration and an emergency declaration. The former typically provides assistance to local, state, and tribal governments for both emergency and permanent work while the latter is a supplement to local and state efforts for emergency services and the federal contribution may not exceed $5,000,000.

There is a nation-to-nation relationship between FEMA, as an arm of the U.S. government, and American Indian and Alaska Native Tribal governments. In the past tribes sought assistance under a declaration for the State. The Sandy Recovery Improvement Act of 2013 includes a provision that amended the Stafford Act, which governs FEMA, to provide Federally recognized Tribal governments the option to make a request directly to the President for a Federal emergency or major disaster declaration.

In cemeteries FEMA funds are typically used for debris removal – but there is much more that they will fund, including archaeological monitoring in case human remains have been exposed by downed trees, replacement caskets in situations where remains have floated or eroded out of their burial locations, as well as monument repairs, critical to make the cemetery whole again – especially in historic settings where the identification of families will be impossible.

Sadly, FEMA seeks to limit its funding of monument repair by stipulating that such repairs will be undertaken only if it is the legal responsibility of the applicant. Thus, states that have sought to "protect" its cemeteries by limiting their liability for monument damage have also precluded obtaining any federal funding from FEMA.

In addition, private cemeteries are not eligible for FEMA funding. Nor are non-profit cemeteries (Disaster Assistance Policy 9521.3). Only public cemeteries are eligible and there FEMA pays for 75% of the work such as debris removal, as long as it is properly documented. In addition, FEMA funding is a reimbursement.

Thus, FEMA's assistance to cemeteries is very limited. Your eligibility must be carefully examined, especially if you view such assistance as your primary means of recovery from a significant regional disaster.

Plot Owners

It is important to involve stakeholders in disaster recovery and among the most important of all stakeholders to a cemetery are those owning plots, especially plots that may have been affected by the disaster. Owners need to know that their loved ones are safe and secure, or if they aren't that the cemetery is working with the appropriate authorities to ensure recovery. Plot owners need to know that their investment is secure and that future burials in their plot won't be affected by this disaster. They require reassurance that the cemetery is professionally and sensitively handling the situation.

This means it is essential that cemeteries not only maintain good records, but that those records are readily available after disasters. This should provide additional incentive to make certain your cemetery records are carefully preserved – whether computerized or stored as hard copies.

Whether by media outreach, individual letters, or phone calls, you should reach out to owners or their agents and schedule an opportunity for them to tour the cemetery and hear from your staff first-hand about what is being done. This also provides owners with an opportunity to learn about insurance options. Remember, receiving no information or incorrect information is especially frustrating to those in a disaster.

You may find it useful – depending on the nature of the disaster – to have meetings that include owners, your friends group, a FEMA representative, local emergency management, the state historic preservation office, and perhaps others. Such meetings may be for informational purposes, allowing agencies and organizations to explain their actions and the reasons for those actions. Or such meetings may be used to solicit ideas concerning recovery options.

SO YOU HAVE A PLAN

Once you have a plan, then what?

First, staff must be familiar with the plan, being able to implement its actions quickly and effectively. This means an effort must be made to ensure that everyone has a copy of the plan. Don't put the plan on the shelf and assume it will transfer to staff via osmosis. Since disasters often occur when you – and other staff – are away from the office, make certain that copies of the plan are available at home or even in your automobile.

Second, for staff to be effective, they must train. They must have both the skills and equipment needed to respond efficiently and correctly. That means there must be administrative support, including an adequate budget.

Good training might include a first aid and CPR course for staff. You may want to provide OSHA training on heat stress, working in the cold, using a portable fire extinguisher, using a chainsaw, electrical safety, or similar topics depending on the needs of your particular cemetery. The need for training applies even to volunteer groups – make certain that those you will count on in a disaster are aware of what needs to be done.

At least once a year have a staff or volunteer meeting devoted to the plan. Go through the different operations and responsibilities. Ensure that new staff members are aware of their responsibilities (and have a copy of the plan). This meeting may be a good time to identify areas where revisions are required (new phone numbers, new vendors, changes in available equipment or supplies, anything that may be different since the plan was initially developed or last updated). At

least once a year you will also need to review your emergency supplies: do batteries need to be replaced, is the first aid kit still well stocked, are the local emergency contacts still current, is the FEMA information current?

Don't allow your disaster plan to be solely reactive. Remember that an integral component is proactive mitigation of potential problems. Once a year check on the status of tree pruning, ensure that your computers are still being appropriately backed up, and check that insurance is up-to-date.

The point is that disaster planning is an on-going process. The goal isn't to "create" a plan, but rather to be constantly adapting and changing with circumstances to ensure that you are ready in the event of a disaster.

ADDITIONAL SOURCES

While there are thousands of publications and on-line sources devoted to disaster planning (Google lists 169,000,000 entries under this term alone), there are surprising few specifically associated with cemeteries. In addition, too often institutions get bogged down in literature, never making any real progress on their own plan.

What we have tried to do here is list a few sources that are likely to be reasonably useful. Since websites have a habit of frequently changing, we are including both the website address, as well as the source website, so if the address has changed, you may still be able to get to the information we've suggested. For publications that aren't on-line, we have included the OCLC number so you may more easily request a copy through interlibrary loan at your local library.

Disaster Planning for Cultural Institutions

Hurricane! Surviving the Big One: A Primer for Libraries, Museums, and Archives (OCLC 40535102)

Steal This Handbook! A Template for Creating a Museum's Emergency Preparedness Plan (OCLC 31402287)

Field Guide to Emergency Response: A Vital Tool for Cultural Institutions (OCLC 70911946)

NPS Primer on Disaster Preparedness, Management & Response -
http://www.nps.gov/museum/publications/primer/primintro.html

NCPTT Disaster Response Tips for Cemeteries
http://ncptt.nps.gov/pdf/Katrina_Cemetery_Response.pdf

National Trust for Historic Preservation Damage Assessment Tips for Historic Cemeteries
http://www.preservationiowa.org/downloads/cemetery_damage_article.pdf

Fillable Library/Museum plan - http://www.dplan.org/

Disaster Planning in a Global Perspective

Global Assessment Report on Disaster Risk Reduction 2013 -
http://www.preventionweb.net/english/hyogo/gar/2013/en/home/GAR_2013/GAR_2013_5.html

FEMA

Before and After Disasters: Federal Funding for Cultural Institutions, FEMA 533 -
http://www.heritagepreservation.org/pdfs/disaster.pdf

Public Assistance Guide - http://www.fema.gov/pdf/government/grant/pa/paguide07.pdf

Public Assistance Program Field Operations Pocket Guide - http://www.mass.gov/eopss/docs/mema/disaster-recovery/fema-pocket-guide-september-2012.pdf

Public Assistance Applicant Handbook, FEMA P-323 - http://www.mass.gov/eopss/docs/mema/disaster-recovery/fema-pocket-guide-september-2012.pdf

A Guide to the Disaster Declaration Process and Federal Disaster Assistance - http://www.fema.gov/pdf/rrr/dec_proc.pdf

FEMA - American Indian and Alaskan Native Tribal communities

FEMA Policy - http://www.fema.gov/tribal-policy

Insurance

Insurance and Risk Management for Museums and Historical Societies (OCLC 12263237)

Insurance Basics for Non-Profits - http://www.charityfirst.com/resources/riskfacts-library/insurance-basics-for-non-profits/

Insurance and Risk Managements 101 for Non-Profits - http://www.pbpatl.org/wp-content/uploads/2012/07/Insurance-Risk-Management-Alert-DC-Bar.pdf

Safety

National Safe Tractor and Machinery Operation Program - http://www.nstmop.psu.edu/

NIOSH Emergency Response Resources - http://www.cdc.gov/niosh/topics/emres/sitemgt.html

OSHA - http://www.osha.gov/

Earthquakes

Whole Building Design Guide, National Institute of Building Sciences - http://www.wbdg.org/resources/seismic_design.php

Shaking Table Test on Seismic Behavior of Tombstone with and without Reinforcement - http://www.iitk.ac.in/nicee/wcee/article/14_12-01-0266.PDF

Homebuilders' Guide to Earthquake-Resistant Design and Construction, FEMA 232 - http://www.fema.gov/library/file;jsessionid=26E0CD9D028AE11CE33FC6F3D432EF78.Worker2Public2?type=publishedFile&file=fema232.pdf&fileid=baffba60-74f6-11db-9b42-000bdba87d5b

Flooding

Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials - http://www.fema.gov/library/file;jsessionid=89F69D413A5AB637E1F75DB8CF6B20B1.Worker2Public2?type=publishedFile&file=fema116.pdf&fileid=e5171430-1e55-11db-b486-000bdba87d5b

Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543 - http://www.fema.gov/library/file;jsessionid=2E4903F94254B8D041B245EE7F81577B.Worker2Public2?type=publishedFile&file=fema543_complete.pdf&fileid=63bddba0-bc64-11db-a8db-000bdba87d5b

Hurricane

Assessing Damage & Restoring Trees After a Hurricane - http://edis.ifas.ufl.edu/pdffiles/EP/EP29100.pdf
Restoring Trees After a Hurricane - http://hort.ufl.edu/woody/documents/EP300.pdf

How to Minimize Wind Damage in the South Florida Landscape - http://edis.ifas.ufl.edu/pdffiles/EP/EP04200.pdf
Hurricane Preparedness and Recovery of Computer Equipment and Software - http://monroe.ifas.ufl.edu/pdf/community/Recovery_of_Computer_Equip.pdf

Urban Forest Hurricane Recovery - http://edis.ifas.ufl.edu/topic_series_urban_forest_hurricane_recovery_program

Tornadoes

Tornadoes: A Rising Risk? - http://www.lloyds.com/~/media/lloyds/reports/emerging%20risk%20reports/tornadoes%20final%20report.pdf

Tornadoes - http://www.ready.gov/tornadoes

Tornado Safe Rooms - http://www.fema.gov/safe-rooms

Wildfires

Fire Resistant Landscaping - http://www.cnps.org/cnps/conservation/pdf/fire/frem38.2_38.3_schettler.pdf

Fire Resistant Plants for Home Landscapes - http://www.firefree.org/images/uploads/FIR_FireResPlants_07.pdf

Wildfire is Coming – Are you Ready? - http://www.readyforwildfire.org/

Vandalism

“Securing Cemetery Plot Gates” - http://www.docstoc.com/docs/50572023/Securing-Cemetery-Plot-Gates
Alternative website
http://nshistoricplaces.ca/conservation_resources/documents/CemeterySecuringCemeteryPlotGatesNPS.pdf

Association of Gravestone Studies, Conservation Talk, Cemetery Vandalism - http://www.chicora.org/pdfs/AGS%20Conservation%20Talk%20-%20Vandalism.pdf

Cemetery Preservation Plans

Historical Research

Identification of Grave Locations and Mapping

Condition Assessments

Treatment of Stone and Ironwork

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